

Need IPO approval

Kang, Elisa Capt.

From: Magnus Bonnedal [magnus.bonnedal@space.se]
Sent: Wednesday, August 23, 2000 1:27 PM
To: skang@ipo.noaa.gov
Cc: peter.sinander@pappa.space.se; Thomas.Lindgren@pappa.space.se;
Jacob.Christensen@pappa.space.se; Anders.Carlstrom@pappa.space.se;
Robin.Bagge@pappa.space.se
Subject: ION2000 paper
Importance: High

(in-coord)

Dear Elisa,

We are preparing a paper for the ION conference 9/19 - 9/22.
I understand from discussions with Peter Sinander,
he has told you we never submitted a paper. This was based on
a misunderstanding between us.

It is a general paper on the Occultation instruments,
we write together with ESA.

I enclose the abstract, the paper shall be submitted 8/28. It covers a
general description of the emerging Occultation measurement technology
and a rather general description of the GRAS and GPSOS projects.

I realize we have a problem getting a formal approval from you, and I
apologize for being late.

I suggest to proceed as follows: I will send you the final version Monday
next week,
(draft on Friday)
and in parallel to ION. The latest day for getting the paper published is
9/29, so it
would be possible to withdraw /change the paper before this date.

Thanks for your support
Magnus

Abstract:

Spaceborne GNSS Radio Occultation Instrumentation
for Operational Applications

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Radio occultation (RO) instruments using GPS (or in general GNSS) as the
source of opportunity are specialised spaceborne GNSS receivers designed to
provide highly accurate measurements of vertical profiles of the temperature,
pressure and humidity in the atmosphere, as well as profiles of electron
content in the ionosphere.

A family of high performance RO instruments is being developed for a number
of European space projects since 1996. The projects include: the three Metop
satellites for operational meteorology, which originate from a joint

programme between Eumetsat (European Organisation for the Exploitation of Meteorological Satellites) and ESA (European Space Agency); the Atmospheric Climate Experiment (ACE), a constellation of micro-satellites being developed by ESA; and the ESA participation in the Japanese GCOM Earth remote sensing programme. The instrument developed for such missions is generically indicated as the GNSS Receiver for Atmospheric Sounding (GRAS), although differences exist between the various missions.

In addition, following an international competition and based on the GRAS development, SAAB Ericsson Space have been selected by the US Integrated Programme Office (NOAA, NASA, DOD) to develop the GPS Occultation Sensor (GPSOS) for the US National Polar Orbiting Environmental Satellite System (NPOESS).

The basic functions of the GRAS instrument include: reception of signals that have crossed the atmosphere at varying altitudes by means of two antenna arrays; acquisition of such signals, also during the (problematic) rise RO events, when a signal first appears after crossing dense tropospheric layers that cause large dynamics in its amplitude and phase; robust signal tracking to provide precise amplitude and phase measurements; on-board processing to support RO event predictions, also with respect to characteristics of each event whose knowledge can aid the tracking process.

Optimised antenna array patterns ensure reception of almost all useful RO events with high gain. The RF front-ends provide high sensitivity and rejection of on-board interferers. Measurements at low signal level are also supported by linear parameter estimation techniques. Dual-frequency measurements in codeless tracking mode are used to determine ionosphere parameters. The GRAS architecture makes use of digital signal processing also in the RF part to achieve digital down conversion and filtering of the signals prior to their processing in a dedicated GPS/GLONASS ASIC.

The paper will summarise the main requirements on the instrument and will illustrate the main technical features adopted. The expected performance and the evolution of the instrument family will also be presented. Finally, some considerations will be given on the impact of RO measurements for weather prediction and climate monitoring following the launch of the first operational RO instrument on Metop-1 in 2003.

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